The Latitudinal Distribution Of Magnetic Holes In The Solar Wind

D. Winter-halter, M. Neugebauer, and E.J. Smith (All at: MS 169-506, JPL, California Institute of Technology, Pasadena, CA 91 109; 818-354-3238; e-mail: danielw@jplsp.jpl.nasa.gov)
A. Balogh (Blackett Laboratory, Imperial College, London SW7 2BZ, UK)

A large number of magnetic holes have been found in the Ulysses data during its cruise in the ecliptic. They are interpreted as convecting structures, probably caused by the mirror instability which exists in high β plasmas with anisotropic temperatures. The characteristics of the holes reflect the solar wind condition of the region in which the holes are formed, and the point of observation may be far removed from where the instability occurs.

A preliminary survey appears to indicate that the number of holes has no significant radial dependence. However, the number of holes does appear to increase with increasing heliographic latitude. Yet the large scale solar wind structures with their compression regions disappeared at= 57° south latitude. Thus any causal relationship between the holes and large scale solar wind structures is questionable. The temperature anisotropy and high β required by the mirror instability must be generated by other mechanisms.

In order to tie the magnetic holes and the mirror instability to their cause, the evolution of their characteristics with heliocentric distance and latitude need to be investigated. With the progression of Ulysses around the sun a survey will be conducted to ascertain the characteristics of the magnetic holes as a function of heliographic latitude and heliocentric distance. A comparison of the results with the solar wind conditions may lead to the identification of the magnetic hole generating mechanism(s).

1. Daniel Winterhalter, Jet Propulsion Laboratory, MS 169-506, Pasadena, CA 91109-8099, USA.
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4. M. Neugebauer
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